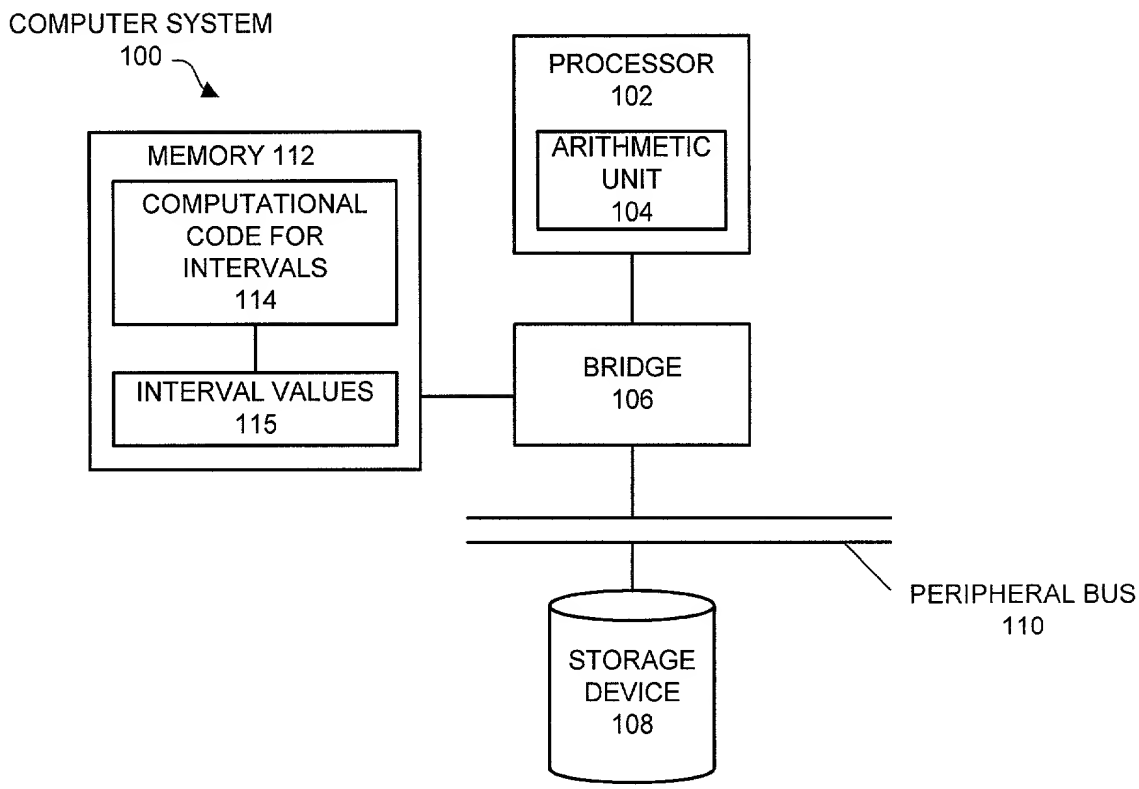
COMPUTER SYSTEM
100
PROCESSOR
102
ARITHMETIC
UNIT
104
MEMORY 112
COMPUTATIONAL
CODE FOR
INTERVALS
114
INTERVAL VALUES
115
BRIDGE
106
PERIPHERAL BUS
110
STORAGE
DEVICE
108

FIG. 1

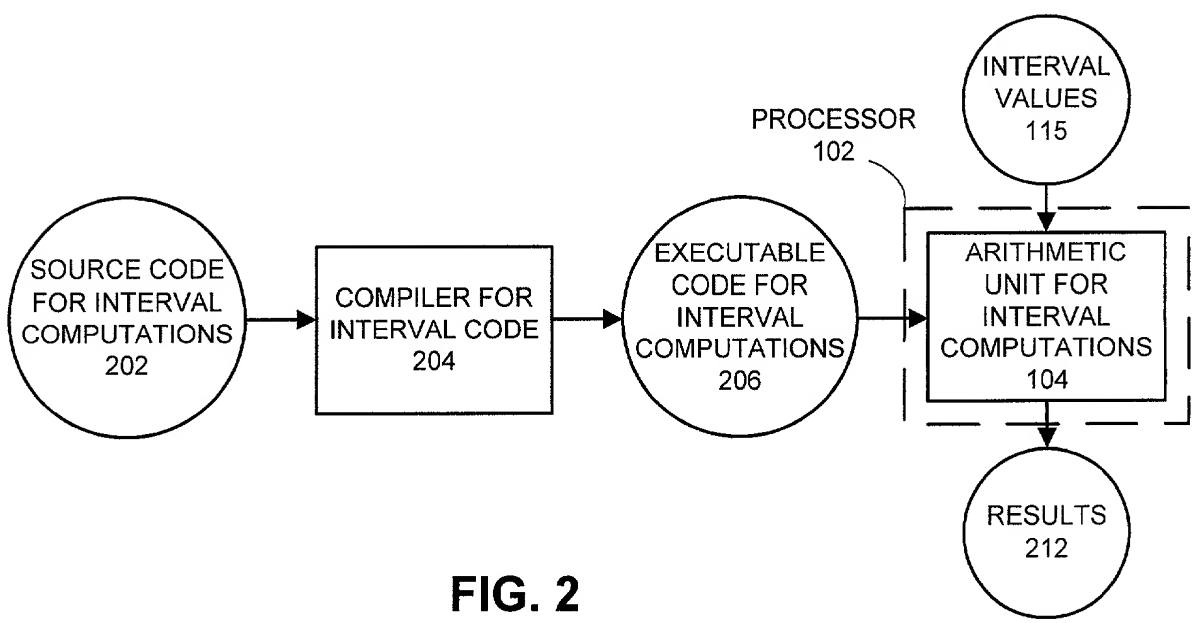
INTERVAL
VALUES
115
PROCESSOR
102
SOURCE CODE
FOR INTERVAL
COMPUTATIONS
202
COMPILER FOR
INTERVAL CODE
204
EXECUTABLE
CODE FOR
INTERVAL
COMPUTATIONS
206
ARITHMETIC
UNIT FOR
INTERVAL
COMPUTATIONS
104
RESULTS
212

FIG. 2

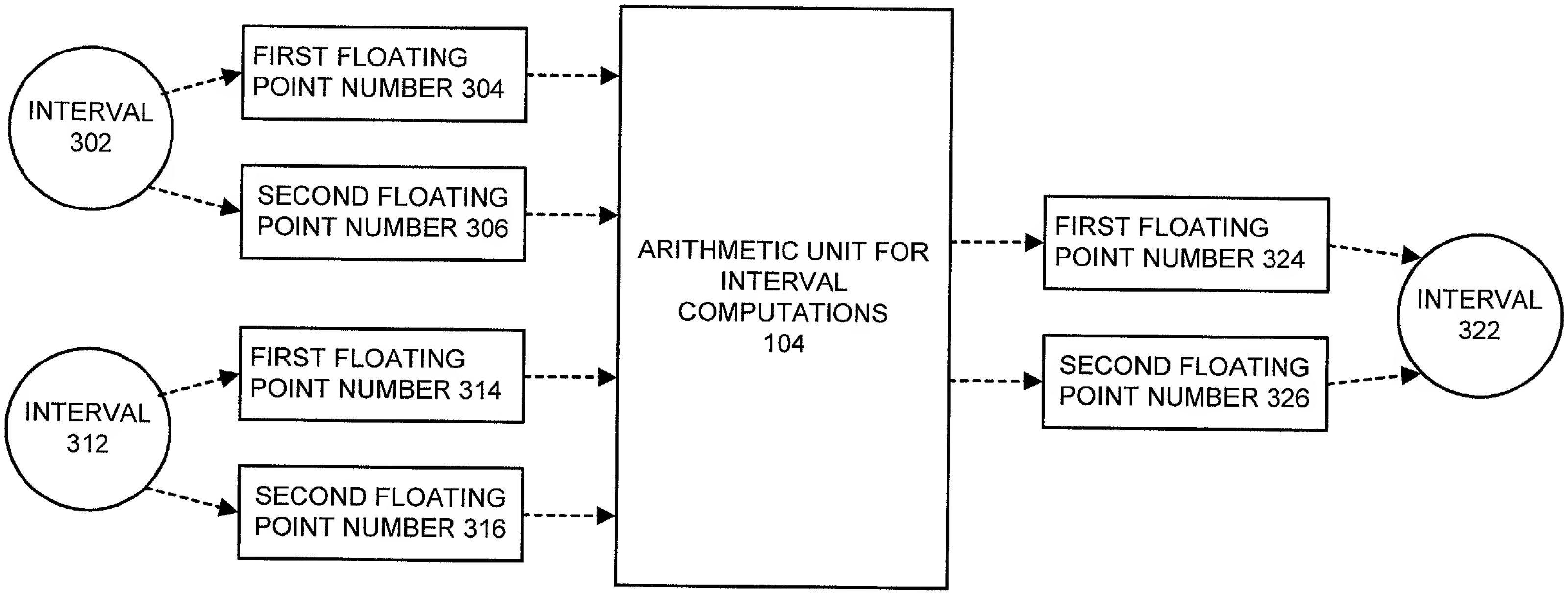
INTERVAL
302
FIRST FLOATING
POINT NUMBER 304
SECOND FLOATING
POINT NUMBER 306
INTERVAL
312
FIRST FLOATING
POINT NUMBER 314
SECOND FLOATING
POINT NUMBER 316
ARITHMETIC UNIT FOR
INTERVAL
COMPUTATIONS
104
FIRST FLOATING
POINT NUMBER 324
SECOND FLOATING
POINT NUMBER 326
INTERVAL
322

FIG. 3

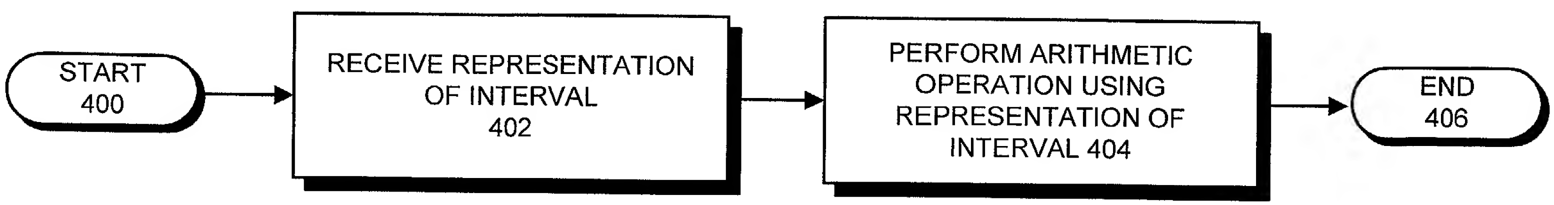
START
400
RECEIVE REPRESENTATION
OF INTERVAL
402
PERFORM ARITHMETIC
OPERATION USING
REPRESENTATION OF
INTERVAL 404
END
406

FIG. 4

$$X \equiv \left[\underline{x}, \overline{x}\right] \equiv \left\{x \in \Re^* \mid \underline{x} \leq x \leq \overline{x}\right\}$$

$$Y \equiv \left[\underline{y}, \overline{y}\right] \equiv \left\{y \in \Re^* \mid \underline{y} \leq y \leq \overline{y}\right\}$$

(1) $$X + Y = \left[\downarrow \underline{x} + \underline{y}, \uparrow \overline{x} + \overline{y}\right]$$

(2) $$X - Y = \left[\downarrow \underline{x} - \overline{y}, \uparrow \overline{x} - \underline{y}\right]$$

(3) $$X \times Y = \left[min\left(\downarrow \underline{x} \times \underline{y}, \underline{x} \times \overline{y}, \overline{x} \times \underline{y}, \overline{x} \times \overline{y}\right), max\left(\uparrow \underline{x} \times \underline{y}, \underline{x} \times \overline{y}, \overline{x} \times \underline{y}, \overline{x} \times \overline{y}\right)\right]$$

(4) $$X / Y = \left[min\left(\downarrow \underline{x} / \underline{y}, \underline{x} / \overline{y}, \overline{x} / \underline{y}, \overline{x} / \overline{y}\right), max\left(\uparrow \underline{x} / \underline{y}, \underline{x} / \overline{y}, \overline{x} / \underline{y}, \overline{x} / \overline{y}\right)\right], if\ 0 \notin Y$$

$$X / Y = \Re^*, if\ 0 \in Y$$

FIG. 5

INTERVAL	REPRESENTATION	
[empty]	$[NaN_{\varnothing}, NaN_{\varnothing}]$	(1)
$[-\infty, +\infty]$	$[-inf, +inf]$	(2)
$\{-\infty, +\infty\}$	$[+inf, -inf]$	(3)
$[-\delta, b]$, $-fp\_max \leq b \leq +fp\_max$	$[-inf, B]$	(4)
$[a, b]$, $a < b$	$[A, B]$	(5)
$[a, 0]$, $-fp\_max \leq a \leq -fp\_min$	$[A, +0]$	(6)
$[0, 0]$	$[-0, +0]$	(7)
$[\epsilon, b]$, $+fp\_min \leq b \leq +fp\_max$	$[+0, B]$	(8)
$[a, -\epsilon]$, $-fp\_max \leq a \leq -fp\_min$	$[A, -0]$	(9)
$[0, b]$, $+fp\_min \leq b \leq +fp\_max$	$[-0, B]$	(10)
$[a, +\delta]$, $-fp\_max \leq a \leq +fp\_max$	$[A, +inf]$	(11)
$[-\infty, b]$, $-fp\_max \leq b \leq +fp\_max$	$[+inf, B]$	(12)
$[a, +\infty]$, $-fp\_max \leq a \leq +fp\_max$	$[A, -inf]$	(13)
$[-\infty, a] \cup [b, +\infty]$ $-fp\_max \leq a < b \leq +fp\_max$	$[B, A]$	(14)

FIG. 6